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Vol. XIX, No. 36 September 28, 1940 GUY P. JONES
EDITOR

Sewage Disposal in San Francisco Bay[*]

By C. G. Gillespie, Chief, Bureau of Sanitary Engineering, State Department of Public Health

Though large in scale, the pollution of San Francisco Bay is typical of harbor pollution throughout the country. Examples of it may be found without effort in any harbor of this state. In California, at least, it is indisputable that the harbors are the seat of the great bulk of our water pollution. Pollution of fresh water streams is insignificant by comparison. In a survey representing populations as of 1930 it was concluded that out of an urban population of 1,500,000 people not yet possessed of sewage treatment and therefore disposing of the sewage in the raw state, 1,200,000 of them were to be found on the shores of San Francisco Bay.

Digressing for a moment, the communities of the state having land disposal have made by far the greatest advance in the sanitary disposal of their sewage. Next in order of accomplishment are communities depending on inland streams, having abated scores of stream pollutions, even though several notorious cases remain. On the other hand, only seven communities have so far dented the harbor pollution situation. However, I hasten to state that so many signs point to such wide scale attack on the harbor problem in this state, it is probably starting on the way out.

Though still the largest offender, the city of San Francisco has so far spent the most by way of a clean-up of San Francisco Bay. In that city there are approximately sixteen sanitary or combined sewers leading into the bay, serving about 630,000 people. Of these, one of them serving about 145,000 people, has recently been diverted through a sewage treatment plant in Golden Gate Park and thence to the mouth of the bay. Treatment is limited to simple sedimentation in a highly mechanized grease removal and sedimentation plant and chlorine is used to protect the famous Cliff House beach against an adverse bacterial showing. The bulk of the sewage of San Francisco, however, still runs untreated into the slips or along the shores of this great harbor city.

Burlingame, Palo Alto and San Leandro, all facing on mud flat waterfronts, have within the last few years put in somewhat similar treatment, and effluent is drained more or less close to shore onto the mud flats. San Anselmo Sanitary District in Marin County, the city of San Mateo, and a small district near Redwood City sewer to sloughs and they typify a similar sedimentation treatment, the effluent of which is piped into the currents of the sloughs. Thus, so far a total population of 230,000 bordering on San Francisco Bay now treats its sewage, leaving the sewage of about 1,000,000 people disposed of in the raw state.

Within the past few weeks the most notable undertaking of all has been inaugurated by the East Bay cities in getting down to an engineering study of ways and means of dealing with the subject for all the eight communities lying between San Leandro and Richmond. If this work culminates in a clean-up, it will take care of 450,000 people and improve twenty-five miles of shoreline. It will reduce to one outlet or to but few outlets, the fifty that now poke out from these shores.

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[*] Presented before Department of Health Officers, League of California Cities, San Diego, September 17, 1940.

Still another sign of the turn of thinking is that quite large but as yet sparsely settled suburbs lying south of San Leandro are about to put in sewer systems and in their planning they take it for granted that they should treat their sewage.

Yet there still remains on the shores of San Francisco Bay fifty-eight communities having an aggregate population of approximately 1,000,000 which are dumping sewage without treatment through 205 sewer outlets scattered along 200 miles of shoreline, a large percentage of which is polluted by sewage.

Disposal of sewage to the harbors has certain peculiarities which induce obnoxious shore pollution and there are other peculiarities which complicate and retard a solution. Harbor waterfronts are generally deprived of the rapid currents which may be found in sloughs and straits and therefore mud flats are common. Where mud settles, sewage will also settle if run out onto that area. Unfortunately, when sewers first became popular in the nineties there was no regulation or farsighted planning and the lazy habit has grown of piping the sewage in the cheapest manner to the nearest point where tidewater could be reached. The bay was looked on as simply a drain or a dump. Therefore, the sewage has no opportunity to disperse and banks of sewage sludge, varying from a few inches to several feet in thickness have built up along the shores adjacent to the outlets. With sewer outlets repeated for every community and sometimes several for a single community, long stretches of shore are in an uninterruptedly polluted condition. However, the whole body of water in a harbor is not damaged by this shore pollution, as some people may suppose. As a matter of fact, the deep offshore waters of the harbor are relatively clean. Therein lies the assurance that harbor cleanups are thoroughly feasible. In some instances, even though there is no sewage mud, on-shore winds blow the floating portion of the sewage onto shores which may otherwise be clean and sometimes attractive for swimming and recreation. These conditions make an ugly, depressing environment.

Waterfronts are rendered low grade, even for industry, by the sewage. Hardly a yacht harbor is really clean and in some instances they get so bad that paint on the boats is turned black by the hydrogen sulphide. Within San Francisco Bay the water is seldom turquoise blue and there are not many beaches or swimming places. Nevertheless, several of them would be potentially pleasurable if it were not for the sewage.

Some health menace is bound to be entailed by these conditions but it can be shown in only a few instances. The most obvious and common objection and compelling reason for a cleanup is the nuisance feature which interferes with the enjoyment of life and property, and probably contributes more than is suspected to intangible though real economic losses. There are no doubt several localities that are getting an unsavory reputation for odoriferous waterfronts.

Several obstacles to the undertaking of a sewage cleanup in harbors have slowed things down. The degree of cleanup that ought to prevail in a harbor affects the cost and it is likely that the fear of expense is the real obstacle. However, ideas on the standards of cleanliness of a harbor are gradually crystalizing. Harbors mean shipping and of course there is a certain amount of unavoidable debris from ships and warehouses. More or less trash will always land on harbor shores. The tendency will, therefore, probably be toward lower standards of protection of harbors than prevail in the case of fresh water streams for water supply or for recreation. A cleanup of sewage litter and smells in a harbor would surely be the minimum of treatment and, more likely, all grease and settleable material will be kept out. However, as time goes on, people may also grow to object to the discoloration by sewage, harbor sleek, or even bacterial contamination associated with sewers. In planning at this stage, I feel it would be wise to foresee such standards and leave it possible to meet such levels should time prove them desirable in a given case.

Considering San Francisco Bay, it would seem that the pattern of treatment, if there is a pattern, will be removal of odoriferous shore conditions and the things obviously coming out of sewers. Simple sedimentation processes, with or without chemicals, and outfalls of sufficient length to reach good current and dispersion to obscure the sewage, are the kind of plants we may expect to see. In effect, this means capitalizing on dilution and dispersion for sewage disposal. In some instances where length of outfall may be unattainable, or where the standards may be high at the outset, some cities may also resort to the use of chemical precipitation processes. A few may get along with so simple a disposal as comminution of the solids and dispersion in the racing currents, as is the temporary practice at Treasure Island.

Sludge disposal will probably be by digestion and compact mechanical filters in the interest of least land space.

But even these relatively simple solutions have their difficulties. Since the sewer outlets have grown up like Topsy, without any planning, the problem of inter-connecting them to avoid a multiplicity of treatment plants and outfalls is a difficulty not found in most other sewage projects. In some cases the expense of interceptors will amount to more than the cost of treatment. Since all the sewage gravitates to shore and the industrial developments tend to hug the shore, the matter of selection of sites for sewage treatment plants, having in mind the cost of property and avoidance of damage to surrounding property values, is at once a unique difficulty not shared by inland cities.

The thorough engineering study which the East Bay cities will undoubtedly make may throw considerable light on this whole subject of interception, sewage plant sites and degree of treatment. In the large cities the use of deep tunnels which cut across town regardless of streets and buildings overhead, may simplify the engineering problem of interceptors, plant location and outlets.

Many cities around the bay, especially those having the older sewer systems, have not looked forward to the day when sewage treatment must be employed, and any number of them have combined sewers. Obviously it is almost out of reason to carry combined flows of sewage any great distance or even to carry them far out into the bay. Therefore, where storm water can not be disconnected and run in surface channels, overflow at shore of mixed sewage and storm water will be necessary each winter. Thus there will be a problem of locating these overflows where they will not too seriously nullify the effects of the routine treatment of the sewage.

Moreover, harbors are the nucleus of industry and industrial wastes not only intensify pollution but they add greatly to the cost of treating municipal sewage. In the case of the East Bay cities, rough investigations have indicated that the organic load from industry is fully twice as significant as the human sewage. The length of outfalls to reach good dispersion is also a serious matter along these wide mud flats, and foundation for such outfalls on the mud is a troublesome engineering problem.

Nevertheless, the cost of a cleanup of the harbor will not be out of line compared with what inland cities have learned they must pay. Though the cities about the bay have been accustomed to a "dirt cheap" form of sewage disposal, it is safe to say that they, too, can afford the cost of a harbor cleanup and will find that they profit by it even more than can be said of inland cities. At this stage our cities are, in fact, simply growing up, so far as sewage disposal is concerned. They are only now taking to a studied sewage disposal. Some have come to the cleanup already and they like it. They were like the boy who while young detested washing behind his ears, yet when he grew up he really enjoyed the sensation.

DUST STUDIES UNDERTAKEN

At the request of the Bureau of Reclamation, U. S. Department of the Interior, arrangements have been made to conduct medical, engineering, and chemical investigations of the health hazards involved in the inhalation of pumicite dust during the excavation of this material for use in the construction of the Friant dam.

CONJUNCTIVITIS AMONG WELDERS

During the past year 746 cases of conjunctivitis among welders were reported in California, which number constitutes 13% of all occupational diseases reported. The hazard is important since it can be prevented by wearing goggles or helmets fitted with glass of proper shade to filter out the injurious ultraviolet rays from the welding arc or torch.

LABORATORY INFECTIONS

During August two cases of pneumonia occurred in the personnel of the research laboratory conducted by the State Department of Public Health in Berkeley. Both workers were critically ill with what is without doubt a virus type of pneumonia and as they were working with such viruses in the laboratory, the infections were without doubt contracted there.

PSITTACOSIS CONTROL

During the month of August, 168 interstate shipping certificates were issued for 2,678 shell parrakeets and 204 larger psittacine birds. Also, 98 shell parrakeet aviary inspections were made.

A fatal case in Long Beach was investigated. The patient was a pet shop operator. Postmortem tissue was found to be positive for psittacosis, also three shell parrakeets in her pet shop were infected. One of these birds was actively shedding the virus in nasal discharges.

Safeguard the health both of body and soul. — Cleobulus.

MORBIDITY

Complete Reports for Following Diseases for the Week Ending September 21, 1940

Chickenpox

82 cases: Albany 1, Berkeley 2, Oakland 11, San Leandro 2, Contra Costa County 1, Fresno 2, Lassen County 3, Los Angeles County 5, Alhambra 1, Glendale 1, Long Beach 2, Los Angeles 12, Monterey County 7, Orange 3, Sacramento 3, San Bernardino County 2, Ontario 2, San Bernardino 2, Coronado 1, San Diego 4, San Francisco 5, Stockton 3, San Bruno 1, South San Francisco 1, Palo Alto 2, Vallejo 1, Petaluma 1, Tulare County 1.

Diphtheria

18 cases: Martinez 1, Brawley 1, Burbank 5, Huntington Park 1, Los Angeles 3, Orange County 1, Corona 1, Sacramento 1, San Bernardino 1, Stockton 1, Santa Clara County 1, San Jose 1.

German Measles

10 cases: Berkeley 1, Long Beach 2, Los Angeles 4, Ontario 2, Coronado 1.

Influenza

15 cases: Los Angeles County 4, Los Angeles 6, Mendocino County 3, Sacramento 1, Ventura 1.

Measles

32 cases: Oakland 2, Fresno County 1, Kern County 2, Los Angeles County 3, Arcadia 1, Glendale 1, Los Angeles 2, Santa Monica 1, Whittier 1, Merced 1, Mono County 2, Riverside County 1, San Francisco 1, Santa Barbara County 7, Santa Barbara 1, Benicia 3, Vallejo 1, Sutter County 1.

Mumps

114 cases: Albany 4, Berkeley 1, Oakland 7, Fresno County 6, Kern County 2, Los Angeles County 7, Arcadia 1, El Segundo 1, Glendale 3, Long Beach 4, Los Angeles 13, Whittier 3, Torrance 1, Lynwood 1, Mono County 1, Orange County 4, Huntington Beach 1, Orange 5, Laguna Beach 1, Corona 2, San Diego 1, San Francisco 11, Stockton 1, San Mateo County 1, South San Francisco 1, Santa Barbara County 1, Santa Barbara 2, Santa Maria 1, Palo Alto 2, San Jose 3, Watsonville 1, Petaluma 3, Tulare County 1, Ventura County 4, Ventura 7, Yolo County 5, Woodland 1.

Pneumonia (Lobar)

35 cases: Oakland 1, Los Angeles County 4, Burbank 1, Hermosa 1, Long Beach 1, Los Angeles 14, Santa Monica 2, Lynwood 1, Monterey County 2, Sacramento 3, Colton 1, San Diego 2, Stockton 1, Ventura County 1.

Scarlet Fever

71 cases: Berkeley 2, Oakland 1, Martinez 1, Coalinga 1, Kern County 2, Los Angeles County 1, Culver City 1, Huntington Park 1, Los Angeles 8, Pasadena 1, San Gabriel 2, South Pasadena 1, Torrance 2, South Gate 3, Madera County 2, Monterey County 1, Monterey 1, Brea 1, Corona 1, Elsinore 1, Hemet 1, Sacramento 4, San Bernardino County 2, National City 1, San Diego 14, San Francisco 1, Lodi 1, Manteca 1, San Luis Obispo 1, Redwood City 2, Vallejo 1, Sonoma County 1, Santa Rosa 1, Sutter County 1, Ventura County 1, Yolo County 2, Yuba County 2.

Typhoid Fever

7 cases: Los Angeles 1, Merced County 2, Plumas County 1, Gilroy 1, Turlock 1, Porterville 1.

Whooping Cough

279 cases: Alameda County 5, Albany 2, Berkeley 15, Hayward 1, Oakland 15, Colusa County 1, Antioch 4, Fresno County 5, Kern County 6, Susanville 6, Los Angeles County 37, Compton 2, Glendale 4, La Verne 1, Long Beach 2, Los Angeles 54, Pasadena 3, Pomona 3, San Fernando 4, Santa Monica 5, Torrance 1, Hawthorne 4, Maywood 7, Madera County 1, Gustine 1, Monterey County 4, Monterey 3, Orange County 2, Santa Ana 7, Placentia 1, Sacramento 2, San Bernardino County 3, El Cajon 1, National City 1, San Diego 1, San Francisco 31, San Joaquin County 1, Stockton 1, San Mateo 2, San Carlos 2, Menlo Park 1, Belmont 1, Santa Barbara 1, Santa Clara County 1, Watsonville 4, Santa Rosa 1, Tulare County 4, Ventura County 11, Oxnard 2, Ventura 2.

Meningitis (Epidemic)

One case: Los Angeles.

Dysentery (Amoebic)

One case: Monterey County.

Dysentery (Bacillary)

14 cases: Placerville 1, Fresno County 5, Los Angeles 5, Sonoma County 3.

Ophthalmia Neonatorum

One case: Los Angeles.

Poliomyelitis

9 cases: Los Angeles County 1, Long Beach 1, Los Angeles 4, Riverside 1, San Bernardino 1, San Francisco 1.

Tetanus

2 cases: Burbank 1, Los Angeles 1.

Trachoma

5 cases: Monrovia 1, San Francisco 4.

Encephalitis (Epidemic)

2 cases: Fresno County 1, Fresno 1.

Paratyphoid Fever (Beta)

One case: Inyo County.

Jaundice (Epidemic)

One case: Eureka.

Food Poisoning

11 cases: Berkeley 3, Oakland 3, Los Angeles County 1, Pasadena 4.

Undulant Fever

4 cases: Fresno 1, Chowchilla 1, Santa Barbara County 1, Lindsay 1.

Tularemia

One case: San Bernardino.

Coccidioidal Granuloma

One case: Bakersfield.

Relapsing Fever

3 cases: El Dorado County 1, San Bernardino County 1, Tuolumne County 1.

Epilepsy

59 cases: Oakland 3, Fresno County 1, Fresno 1, Los Angeles County 10, Glendale 1, Los Angeles 20, Sacramento 1, San Bernardino 1, San Francisco 7, San Joaquin County 13, Sonoma County 1.

Rabies (Animal)

3 cases: Los Angeles 1, Solano County 1, Tulare County 1.

MANY ATTEND UNIVERSITY INSTITUTE

The Public Health Nursing curriculum in the Department of Hygiene of the University of California presented, for its summer session, a three weeks' institute on Maternal and Infant Hygiene, July 1 to 19.

The Bureau of Child Hygiene of the California State Department of Public Health sponsored the institute, providing lecturers among its staff members and also gave the services of Dr. Frank Shade, of Los Angeles, who presented a series of lectures on the Medical Aspects of Maternal Care. Miss Louise Zetzsche, supervisor of the maternal program of the Denver Visiting Nurses' Association, was guest instructor. Sixty-five registered nurses, representing five states and Hawaii, attended the institute.

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